UVR16x2

Freely programmable universal controller

User manual

en

TECHNISCHE ALTERNATIVE

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Foreword

For information about programming or installing the controller, separate instruction manuals are available on our homepage (www.ta.co.at) and on the controller's SD card.

The UVR16x2 is a freely programmable universal controller for complex control tasks in solar thermal and heating systems as well as in building management.

Experts (programmers) can use the options of linking function modules, using them multiple times and connecting multiple controllers to create extensive programs for optimum control.

However, the wide variety of systems means that a single instruction manual for all application scenarios is not possible. You should therefore always seek instructions from your heating system's installer.

The programmer will create a **Function overview** for user operation. In the function overview, you can check all important measurements and change settings in selected functions which are important to you as the user.

In this manual, we explain how you can select the function overview and how you can adjust the settings on your system.

Note: Your personal system will normally vary from the examples in this manual.

User levels

To prevent incorrect operation of the controller, three different user groups can log onto the controller: **User**, **Technician** or **Expert**. Access by Technicians and Experts requires a password.

The controller is always in User mode when the controller is started or when new function data has been loaded.

User	Displays and permitted actions
User	**Function overview** with control options **Value summary** **Inputs**: display only, no access to parameters **Outputs**: changes to the status of outputs enabled for users, display of hours run, no access to parameters **Fixed values**: changes to the value or status of the fixed values enabled for users, no access to parameters **Functions**: display of the **function status** including **start options** from the function status, no access to parameters **Messages**: display of active messages, hiding and deleting messages **CAN and DL bus**: no access to parameters **Default settings**: no access possible **User**: change of user (with password entry) **System values**: setting the date, time, location data
Technician	**All of the above plus**: - Changes to the **input** parameters (except for type and measured variable), no creation of new ones - Changes to the **output** parameters (except for type; status only if enabled for User or Technician), no creation of new ones - Changes to the **fixed values** parameters (except for type and measured variable; value and status only if enabled for User or Technician), no creation of new ones - Changes to **user defined designations** and creation of new ones **Functions**: changes to user defined input variables and parameters; output variables are only visible in function status - All settings in the **CAN** and **DL bus** menus **Data administration** actions
Expert	**All** actions and **all** displays are accessible.

Functional design

The UVR16x2 controller has 16 sensor inputs to which temperature sensors, other sensors and switches can be connected.

These sensors supply the controller with information about the status of the system. The controller can also receive additional information via bus cables (CAN bus and DL bus).

The information is conveyed to the controller's function modules in the form of input variables, or is utilised for the purposes of display only.
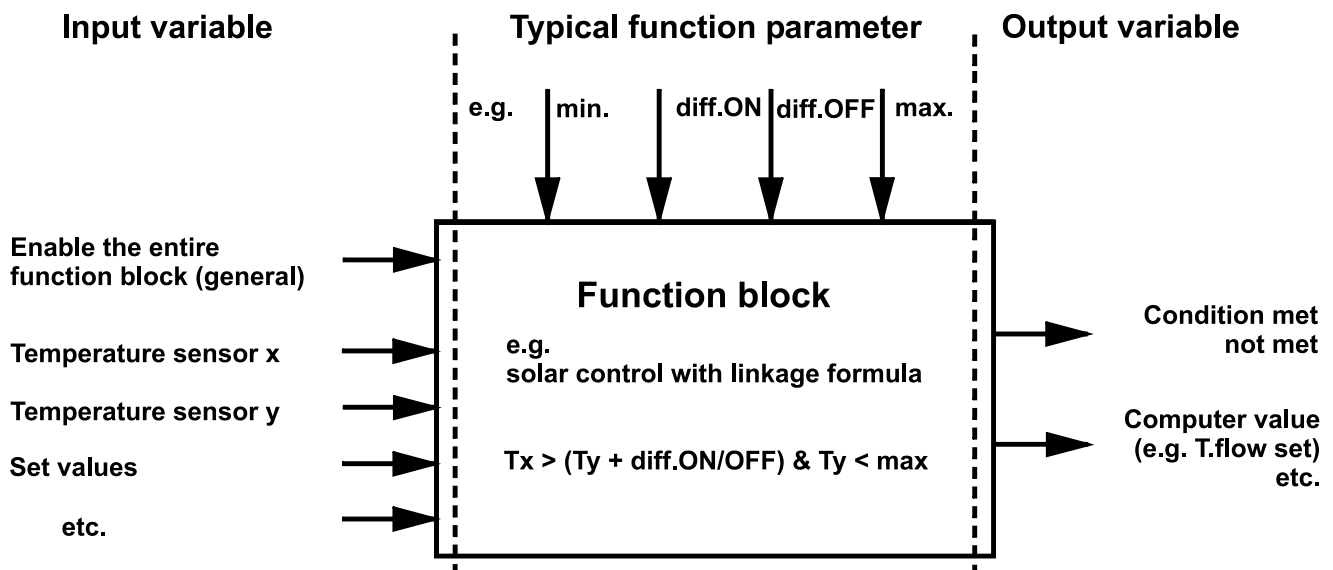
40 different functions are stored in the controller. Each of them can be applied multiple times, allowing up to 128 functions to be programmed in total.

The input variables and the parameter settings entered by the user provide the function with all data required to calculate the output variables.

Each function can be activated or deactivated with **Enable**. Decisions and set values are calculated inside the function and made available as output variables.

The values of the output variables can have a switching effect on outputs or a control effect on pumps, burners or heat pumps. There are 16 outputs available for this purpose. They can also be made available to other functions or to other CAN bus devices via the CAN bus.

These features are illustrated in the following **schematic diagram** of a function module:

Input variable	Typical function parameter	Output variable
	e.g. min. diff.ON diff.OFF max.	
Enable the entire function block (general)	**Function block**	Condition met not met
Temperature sensor x	e.g. solar control with linkage formula	
Temperature sensor y		Computer value (e.g. T.flow set) etc.
Set values	$Tx > (Ty + diff.ON/OFF)$ & $Ty < max$	
etc.		

The 16 outputs perform various different tasks (switching output, output pair for mixers or dampers, analogue outputs for speed control or modulation).

Up to 62 CAN bus devices can be linked together via the CAN bus. These CAN bus devices can exchange information via CAN inputs and outputs.

The C.M.I. (Control and Monitoring Interface) allows remote access via a network and the internet.

Operation

The UVR16x2 is operated via a 4.3" **touchscreen**. For greater ease of use, an **operating pen** is provided, which can be found behind the flip-up cover.

View with open cover
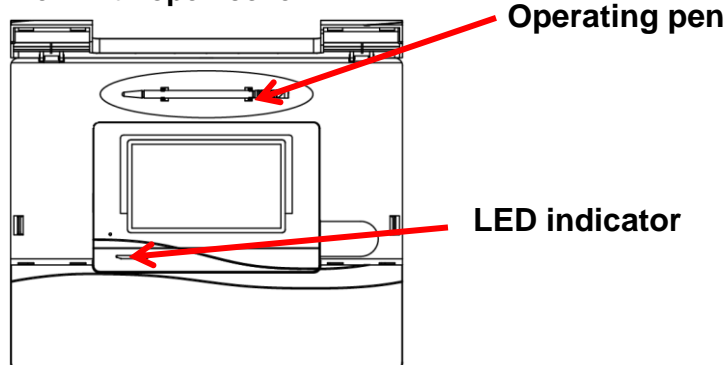
You can use the pen to tap operating fields on the screen and can scroll the view displayed by sliding it with the pen.

LED indicator

The indicator can indicate a variety of statuses.

Indicator	Explanation
Steady red light	The controller is booting up (= start routine after switching on, resetting or updating) **or**
Steady orange light	Hardware is initialising after booting up
Flashing green light	After hardware initialisation, the controller waits about 30 seconds to receive all the information necessary for a function (sensor values, network inputs)
Steady green light	Normal controller operation

The following sequence therefore occurs at **Controller start**:

Red – Orange – Flashing green – Steady green light

An active **Message** can be displayed by a change in the LED indicator.
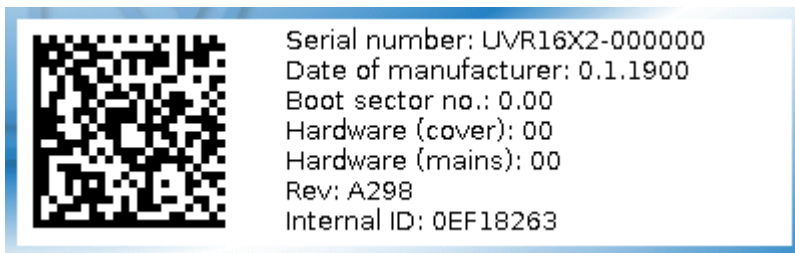
Information on the display

Version

After the controller is booted up (= started), the display shows the **Version** of the current operating system.

You can then scroll down to view the serial number and the date of manufacture.

Serial number: UVR16X2-000000
Date of manufacturer: 0.1.1900
Boot sector no.: 0.00
Hardware (cover): 00
Hardware (mains): 00
Rev: A298
Internal ID: 0EF18263

Tap the "Home icon" to go to the **Function overview**. The function overview is the most important menu for the user. There you can enter your settings and check sensor values.

Tapping takes you to the **main menu**. In the main menu you can view settings and display values in various sub-menus and can also change certain statuses that have been enabled for you.

Status line

The top part of the display shows the output status, messages, faults, date and time.

Output status

Active outputs are highlighted against a **green** background.

In the following example, outputs 1, 3 and 6 are active.

Output 5 has been **deactivated** manually (Manual/OFF) and output 6 has been **activated** manually (Manual/ON). Outputs that have been switched to Manual/OFF or Manual/ON are marked with a **hand symbol** under the output number.

When a message is active, outputs may be switched to dominant off or dominant on. This is indicated by a red border around the affected output (see chapter **Main menu** / **Messages**).

Output pairs (e.g. for mixer drive) are shown in the status line with a **+** between the output numbers.
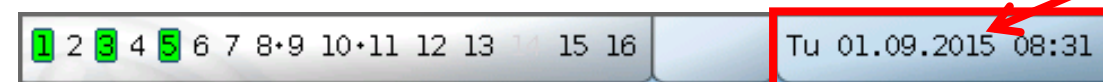
Example: Outputs **8+9** and **10+11** have been programmed as output pairs

Tapping the outputs display takes you to the **Outputs** menu (see chapter **Main menu** / **Outputs**).

System values (date, time, location)

The system values **Date** and **Time** are shown in the status line at top right.

Tapping that status field takes you to the menu for the system values.

Example:

Operation

The system value parameters **that you can change** are displayed first.

- **Time zone** - **UTC** stands for "Universal Time Coordinated", also known as GMT (= Greenwich Mean Time).
- **Summertime** – **Yes** if summertime is active.
- **Automatic time change** – If **Yes**, the time will switch over automatically to summertime according to the specifications of the European Union.
- **Date** – The current date (DD.MM.YY).
- **Time** - The current time
- **GPS latitude** – Geographical latitude according to GPS (= global positioning system)
- **GPS longitude** - Geographical longitude according to GPS

The values for geographical latitude and longitude are used to determine the location-specific solar data. That data can be used in functions (e.g. shading function).

The factory default settings for the GPS data are for the location of Technische Alternative in Amaliendorf, Austria.

Next, the location-specific solar data is displayed.

Example:

Sunrise	06:15
Sunset	19:44
Solar altitude	30.8 °
Direction of the sun	114.9 °

- **Sunrise** – Time
- **Sunset** – Time
- **Solar altitude** – Specified in ° as measured from the geometric horizon (0°), zenith = 90°
- **Direction of the sun** – Specified in ° as measured from the north (0°)
  North = 0°
  East = 90°
  South = 180°
  West = 270°

Messages, faults

The centre part of the status line displays messages and faults by means of warning symbols.

1 2 3 4 5 6 7 8·9 10·11 12 13 15 16	⚠ ⚠	Tu 01.09.2015 08:37
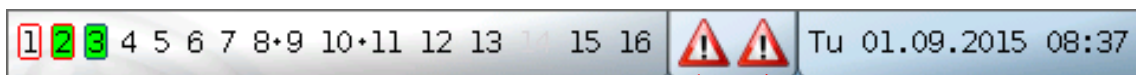
Left: indicates one or more messages

Right: indicates one or more sensor or bus errors

Tapping the warning symbol on the **left** opens the pop-up window for a "hidden" message (see chapter **Messages**). Tapping the warning symbol on the right takes you to the "Messages" menu (see chapter **Main menu** / **Messages**).

Function overview

The function overview will only be displayed with controller version V1.04 or higher.

Tapping the "Home" icon opens the function overview. This overview is designed to provide the user with a simple way of controlling and monitoring the system.

The function overview can be **freely designed** by the programmer and can therefore look different on every controller. It can be displayed with the aid of **graphics** or simply as a **table**.

Values selected by the programmer can be changed either by all users, by Experts only or by Experts and Technicians. Many values (e.g. sensor values) can generally never be changed.

If multiple UVR16x2 controllers in the system are linked by CAN bus, the function overview can also be programmed to display the values of other controllers.

The function overview can comprise several pages, in which case a **Link** (= link on the screen linking to another page) is required for switching to a different page. The appearance of links can be freely designed by the programmer. Access to some pages may be restricted to certain user groups (with or without password entry).

The function overview can be programmed with the first page showing an overview of the following pages with links to those pages.

Touching the relevant link takes you to the display on the required page.
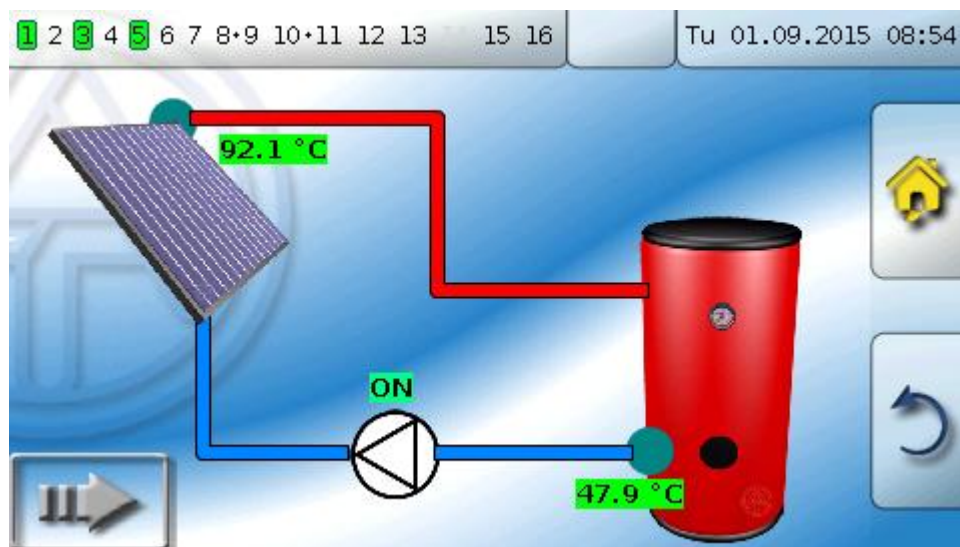
Examples:

Start page with 4 links
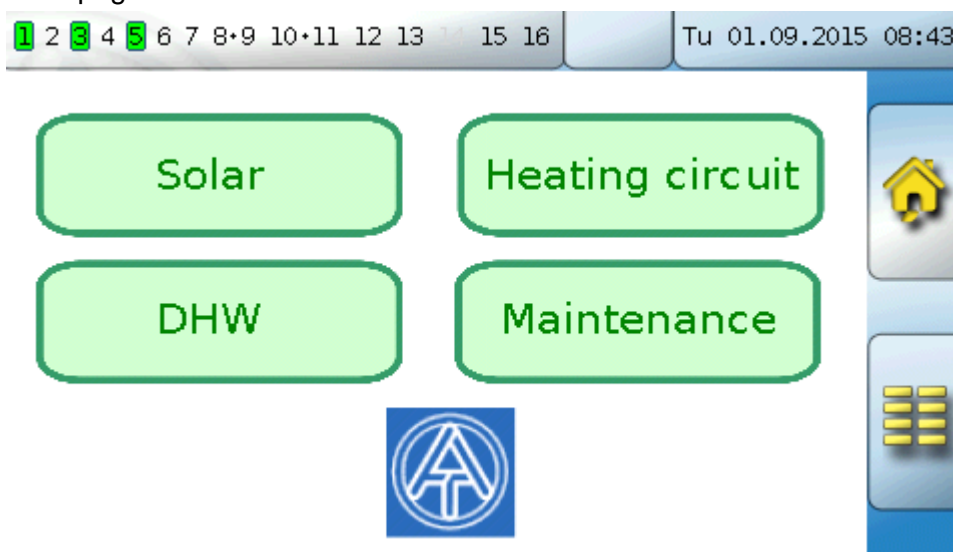
From the **start page** (= first page), tapping takes you to the controller's **main menu**.

Function overview, general

Page with simple graphical design and link at bottom left for switching to the next page:

Page with display in table form and two links, forward and back:

Page with graphic elements and links to time switch, calendar and settings:

| 1 2 3 4 5 6 7 8·9 10·11 12 13   15 16 | | We 09.09.2015 14:52 |

Heating circuit

Operating mode	Holiday (6)
Room temperature	20.3 °C
Outside temperature	11.2 °C
Effective set room temp.	12.0 °C
Flow temperature	33.5 °C
Set flow temperature	5.0 °C
Htg circ. pump	OFF

Page with graphic elements and "back" link:

| 1 2 3 4 5 6 7 8·9 10·11 12 13   15 16 | | Tu 01.09.2015 09:08 |

Heat curve

| Heat curve Room influence | 50.0 % |
| Heat curve Level | 0.0 K |

Flow temperature

60.0 °C

35.0 °C

Outside temp.

+10   -20
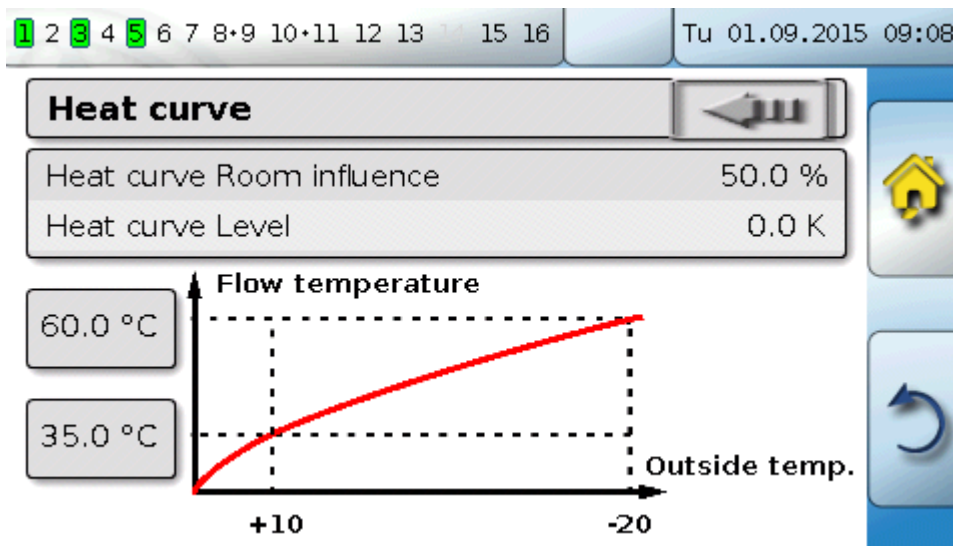
You can go back to the page **displayed previously** by tapping .

To go to the **start page** of the function overview, tap .

From the **start page**, tapping takes you to the controller's **main menu**.
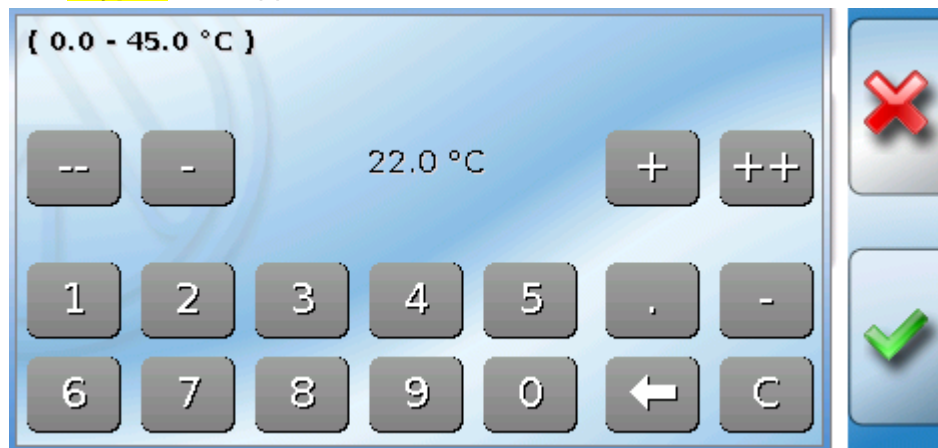
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Changing values

Tapping the required value opens either a keypad or a selection box. Values can only be changed if they have been enabled for the user level by the programmer.

Example:

Changing the set room temperature "T.room standard" via a keypad:
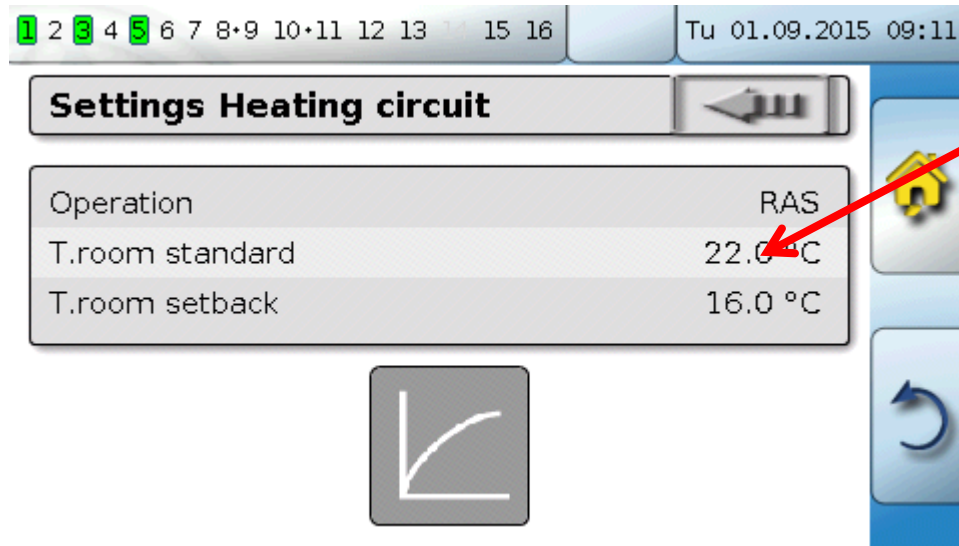
The **keypad** then appears:

The current value is shown (example: 20.0 °C).

The top line shows the permitted entry range (example: 0.0 – 45.0 °C).

You can make entries using either the correction keys (**--**, **-**, **+**, **++**) or the numeric keys. The correction keys **-** and **+** change the value of the first digit to the left of the decimal point (units); keys **--** and **++** change the value of the second digit (tens).

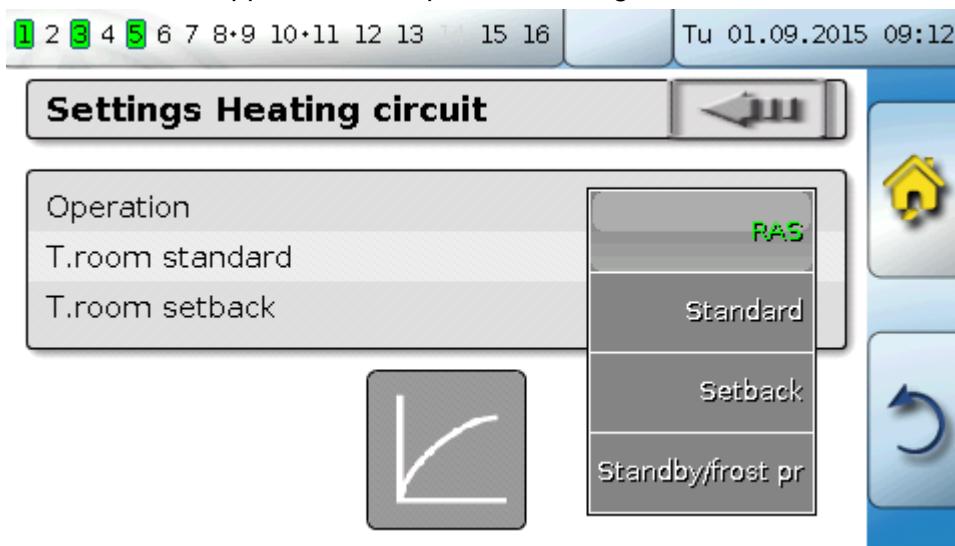The arrow key ⬅ shortens the value by one digit place; key C sets the value to zero.

Finish your entry with ✔; discard it with ✖.

Example:

Changing the operating mode of the heating circuit with a ==selection box== ("RAS" means that the operating mode is set by the room sensor's slide switch):
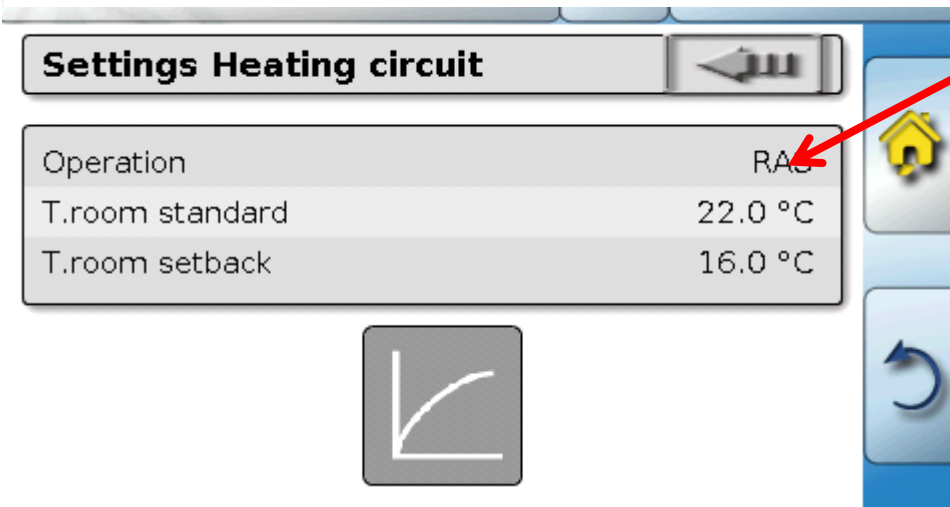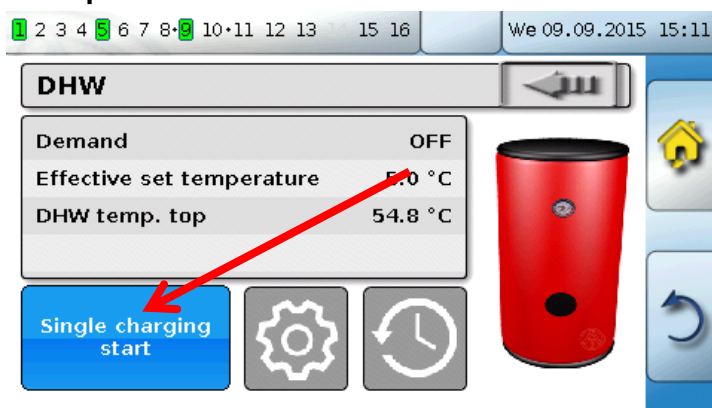

A selection box appears with all possible settings:

When you tap the required setting, it is changed and the required setting is displayed in the function overview.

Some functions have a ==touch field== e.g. for starting DHW demand outside the demand time.

Example:

Tapping the **field** starts the action.

The most important functions

The most important functions for the user are:

- **Heating circuit**
- **Time switch**
- **Calendar**
- **Individual room control**
- **DHW demand**

- **Blind control**
- **Maintenance**
- **Heat meter count**
- **Start-stop**
- **Solar control**

Various setting parameters for these functions are described in the following:

Heating circuit

In the heating circuit function, the **set flow temperature** is determined for the heating circuit and the heating circuit pump is switched off or on according to adjustable shutdown conditions.

In many systems, the set flow temperature is calculated according to the outside temperature, the setting parameters, the time program and, if a room sensor is installed, the room temperature, and is then defaulted as the set temperature for a mixer or a boiler.

Consequently, the following pages may be visible on the function overview.

Page with **display values** which cannot be changed:

Operating mode shows the currently active operating mode. The operating mode is set by the controller setting for "Operation", the calendar function, the maintenance function, the "Window contact" status or the "External switch" status. Depending on the status of these functions and input variables, the operating mode may therefore vary from the internal setting for "Operation".

The Room temperature and the Flow temperature are the current **measurements**.

The Effective set room temperature and the Set flow temperature are the current **set values**.

When the heating circuit pump is switched off due to a shutdown condition or the heating circuit is in standby mode, the set flow temperature is shown as 5 °C.

If the outside temperature sensor is faulty or the sensor lead is disconnected, the heating circuit switches to Fault mode. In that case, the heating circuit is controlled to a fixed outside temperature of 0 °C. The fault on the outside temperature sensor is displayed in the upper status line if "Sensor check" is activated.

Settings for the **heating circuit operation** with an additional **link to the heat curve parameters**:

Settings Heating circuit	
Operation	RAS
T.room standard	22.0 °C
T.room setback	16.0 °C
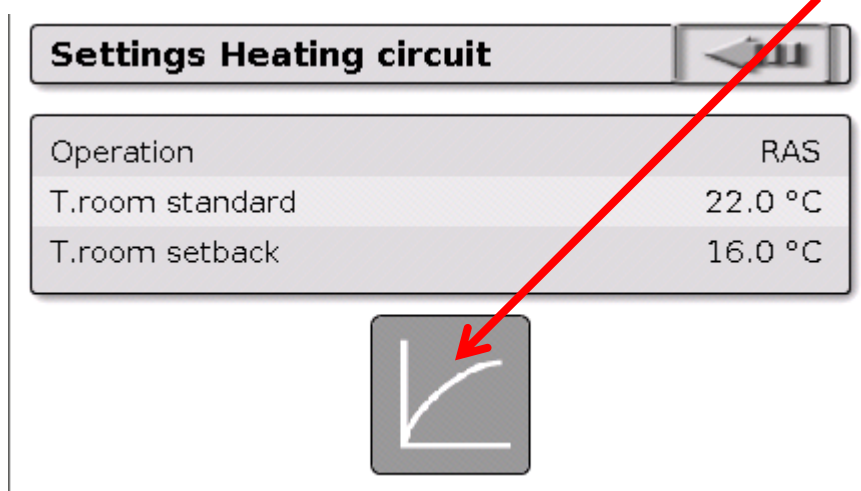
You can change the **internal** operating mode of the function by changing the **Operation** setting. **RAS** indicates that the setting of the room sensor is applied. If there is no room sensor installed, the setting **Time/auto** applies the time switch's time program to the heating circuit. Other options to choose from are **Standard** (= continuous heating mode), **Setback** (= continuous setback mode) or **Standby/frost protection** (= heating circuit shutdown subject to the programmed frost protection conditions).

In **Standby** mode, the controller's **frost protection function** is operational. The programmer defines the **frost protection limits** for the outside temperature and (if a room sensor is installed) the room temperature. If one of those temperatures falls below the limit, frost protection is activated and the heating circuit pump is switched on. The set flow temperature will be set to at least the programmed minimum temperature. The activation of frost protection can be delayed when changing over from standard to setback mode.

The **internal** operating mode may differ from the actual operating mode because the calendar function, the maintenance function, window contacts and the "External switch" can override the internal operating mode.

T.room setback is the required room temperature in **setback mode** if a room sensor is installed. If there is no room sensor, this value represents a notional room temperature. Changing this value moves the heat curve upwards or downwards to a **parallel** position, thus increasing or decreasing the calculated set flow temperature.

T.room standard is the corresponding value for **heating mode**.

The changeover between heating mode and setback mode is carried out with the **Time switch** function, which is described in the next chapter.

Heating circuit function

Settings for the **heat curve**:
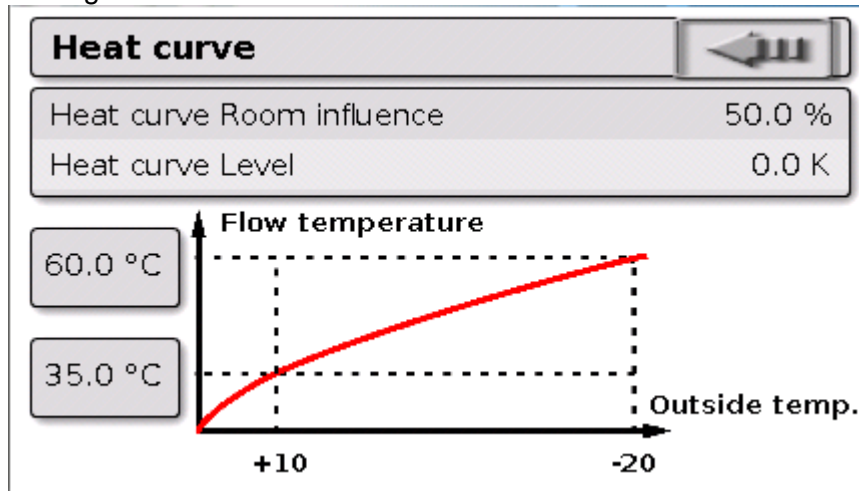
Room influence: If a room sensor is installed, you can use this setting to define how much influence the actual room temperature should have on the calculation of the set flow temperature. Values higher than 50 % will have a very great influence and will be unfavourable in most cases.

Level: This parameter influences the calculation in the same way as changing the values T.room standard and T.room setback, but affects both heating mode and setback mode. It too moves the heat curve to a parallel position. Negative values can be entered as well.

The heat curve can be defined using two different methods:

Definition of the set flow temperature by **two outside temperature points** at **+10 °C** and **-20 °C**, or by the **slope**.

In the example above, the method with the two temperature points was chosen. With **T.flow +10 °C** and **T.flow -20 °C**, both the slope and the curvature of the heat curve can be defined, allowing the heat curve to be optimally matched to the system.

If the "slope" method is chosen, the slope can be defined instead of the two temperature points.

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Time switch

The **Time switch** function is used to define the changeover between T.room standard and T.room setback in the **heating circuit**. The function can be programmed for a single heating circuit only, or jointly for several heating circuits. The "Time switch" can also be used to switch other functions or statuses.

There are up to **7 time programs** available with up to **5 time windows** available per time switch. It is also possible to subject the start and OFF times to the influence of other variables, and to specify your own set values for the time window.

The following describes the simple setting of a time program without set values:

In **Time program 1** the days **Monday – Friday** have been selected (the red keys). The first time window goes from **06:00 to 09:00 h**, the second one from **16:00 to 22:00 h**, and the third time window is unused.

Tapping **2** allows you to switch to the 2nd time program, for the weekend:
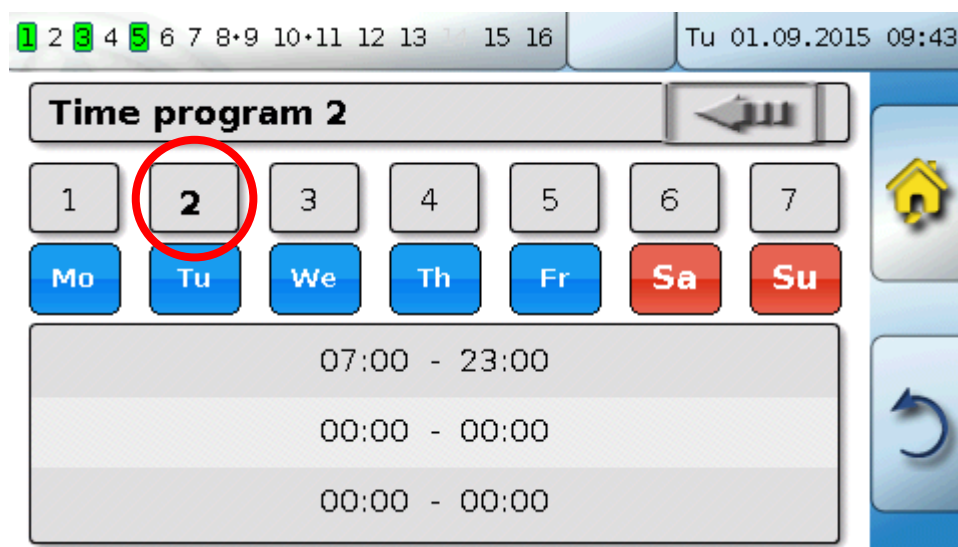
For the **weekend**, only the first time window from **07:00 to 23:00 h** has been set.

Calendar

The calendar function overwrites the internal settings and specifications of the time switch for the heating circuit. The following calendar modes can be set:

- **Holiday**
- **Party**
- **Bank holiday**
- **Standby**

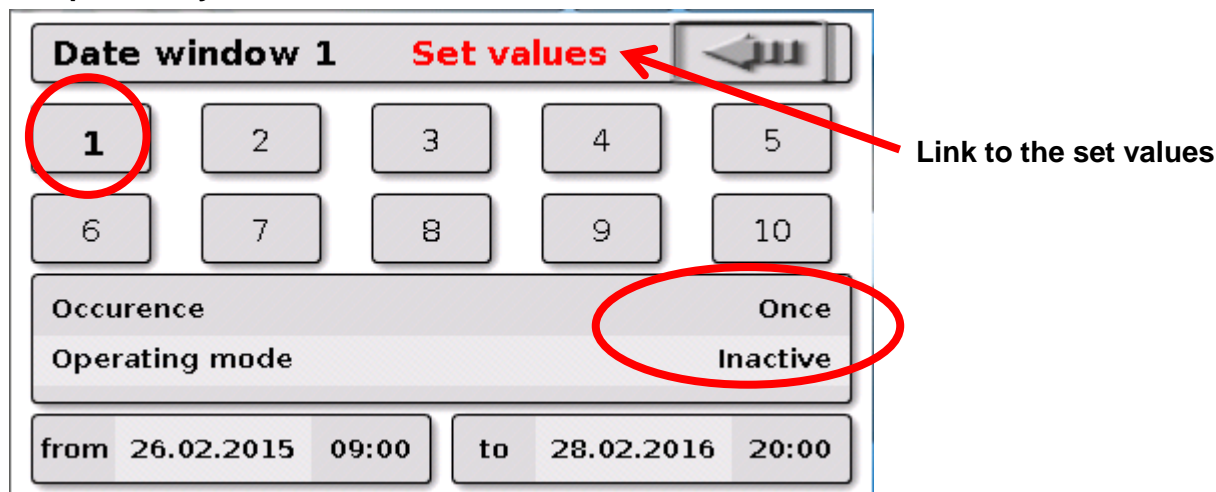There are up to 10 date windows available in which each mode can be set. Up to 3 set values can be set in each mode, one of which can be applied in the heating circuit as the set room temperature.

The respective appearance in the function overview can vary greatly. The following describes one possibility:

Link to the set values

The calendar function is currently **Inactive**. Here you can define whether the calendar mode should be applied once or annually. Tapping the displayed **Operating mode** allows you to set the required operating mode:
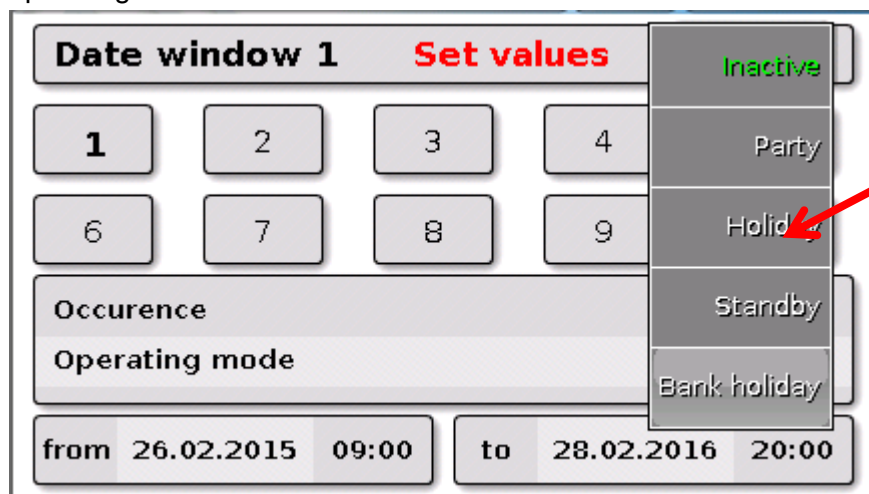
After selecting the operating mode, the **Start** and **End** are selected.

A **Holiday** has been set from 26/02/2015 09:00 h to 28/02/2015 20:00 h. During that time, the programmed set room temperature ("Set value") for holiday will be applied.

The **Holiday (6)** operating mode is visible in the **Heating circuit** menu when the conditions are met:
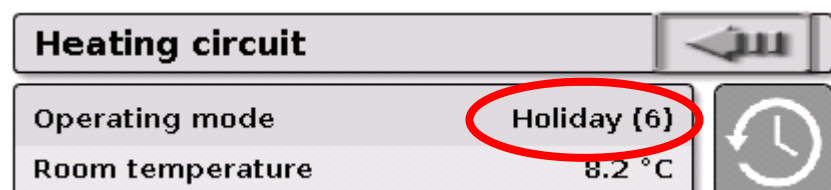
Depending on programming, there may also be another window with **adjustable Set values** for each mode:

Set value 1	
Not active	0.0 °C
Party	22.0 °C
Holiday	8.0 °C
Standby	5.0 °C
Bank holiday - If time window met	22.0 °C
Bank holiday - If time window not met	16.0 °C
Time window - Start 1	07:00
Time window - End 1	23:00
Time window - Start 2	00:00
Time window - End 2	00:00

For the **Bank holiday** operating mode, time windows can be set with different set values for the times inside and outside the time window.

The set value for **Inactive** (0 °C) is displayed but is not actually applied in the heating circuit function.

Individual room control

This function is specially designed for the control of **zone valves** for heating and/or cooling of individual rooms. Room temperature thresholds and the operating mode switch on the room sensor can be utilised to switch between heating and cooling. Shutdown conditions prevent heating or cooling beyond the outside temperature thresholds.

The floor temperature can also be monitored in order to prevent excessive cooling or heating of the floor.

Example:

The highlighted **Set room temperature** can be an adjustable setting. However, this value can also be a set value defaulted by a time program in a **Time switch** function.

All other values are display values indicating the status of the room.

If both heating and cooling are provided, the operating mode switch of a **RASPT**, **RAS-PLUS** or **RAS-F room sensor** can be used to define the operating mode of the function:

AUTO: The system switches automatically between heating and cooling according to settings.

STANDARD: Only heating mode is allowed.

SETBACK: Only cooling mode is allowed (frost protection remains active).

DHW demand

This function is used in many systems to define the domestic hot water cylinder temperature.
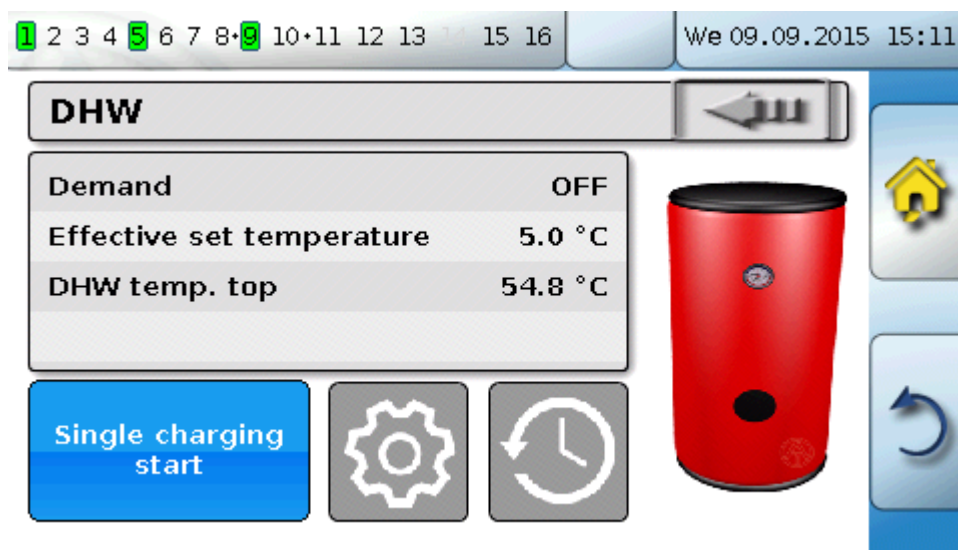
The **Demand** is currently set to **OFF**, so the effective set temperature is only 5 °C.

You can define the set temperatures via the **Settings** key (gearwheel):
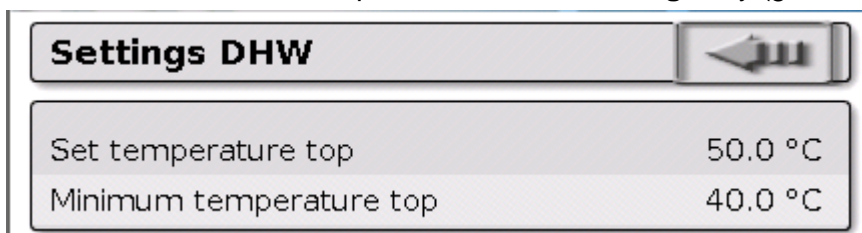
The DHW demand can be switched between two set temperatures via a time program from the **Time switch** function. The **Set temperature** applies inside the time window, and the **Minimum temperature** applies outside it.

The **Single charging start key** can be used to start demand outside the time window. It remains switched on until the set temperature is reached.

The time switch may look similar to the time switch for the heating circuits:
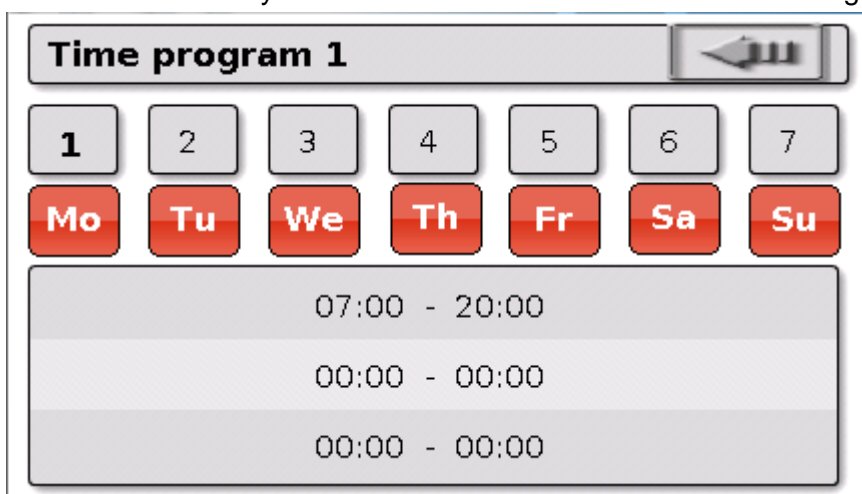
Here a uniform time of 07:00 – 20:00 h has been selected for the entire week.

Blind control

In **Auto mode**, the blind control applies the set position from the **Shading function**.

The settings of the shading function are programmed according to the design of the blinds, the position of the sun, and restrictions imposed by the building. Every building face (cardinal direction) and window situation requires its own shading function.

The shading function calculates the required setting of the blinds based on the cardinal direction, the position of the sun at the particular time, and restrictions imposed by parts of the building.

It is possible to switch to **Manual mode** and open or close blinds manually by pressing the keys or via digital input signals from external blind pushbuttons.

After the manual action, the function remains in **Manual mode** until changeover to automatic mode. The **changeover** from manual to automatic mode can be triggered by simultaneously pressing the external blind pushbuttons for **Open blind** and **Close blind**, by pressing the **Switching to automatic mode** key, or at a changeover time defined by the programmer (e.g. 24:00 h).

The two percentage values for the **Actual position** specify the following positions:

1st percentage: slat inclination,
0 % = **horizontal**, 100 % = **vertical**

With roller shutters, this value is always 0 %.

2nd percentage: lowering level
0 % = blind or shutter at the **Top**, 100 % = at the **Bottom**

In the example, automatic mode is active and the shading function defaults an inclination of 0 % (= horizontal) and a level of 98 % (almost closed).

Manual mode is activated with **Open blind** or **Close blind**. The blind opens or closes for as long as the key is being tapped, and automatic mode is deactivated.

Fully open blind and **Fully close blind** move the blind into its corresponding end position, and automatic mode is deactivated.

Subject to programming, a **Safety shutdown** may also be specified, e.g. by means of a wind sensor. This will move the blind into a predefined position, overriding any other settings.

Maintenance function

The maintenance function is designed as a service function for a flue gas inspector and/or as a simple burner switch for a flue gas emissions test. When the function starts, the burner is switched on for an adjustable total runtime.

In order to dissipate the heat, the heating circuits set in the parameters are activated with the maximum permitted flow temperature. While the maintenance function is active, the set flow temperature displayed for these heating circuits is 5 °C, the effective set room temperature displayed is 25 °C and the operating mode displayed is "Maintenance (10)".

Once the heat generator demand is switched off (function stopped), the heating circuits involved remain active for a further three minutes in the special "Maintenance" mode in order to dissipate residual heat from the boiler. Only then does the heating circuit return to the previous operating mode.

Subject to programming, the maintenance function may be able to be started with external switches or pushbuttons, or directly from the function overview.

Example:
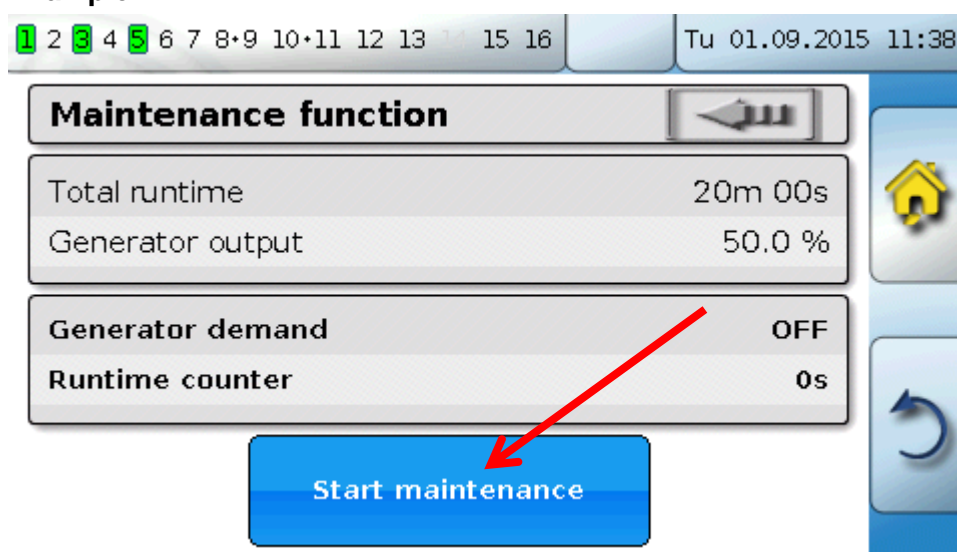
The **Total runtime** is adjustable and is currently 20 minutes.

The maintenance operation can be started by tapping **Start maintenance**.

After starting, **Stop maintenance** appears, which can be used to stop the maintenance operation even before the runtime has expired.

A **runtime counter** is displayed so the time progress can be monitored.

Heat meter

The heat meter is a very useful function for solar thermal systems, if a flow sensor is installed.

The status of the system and its yields can be viewed at any time, allowing you to easily check that the system is in good working order.

To capture the amount of heat, the controller requires the flow temperature, return temperature and flow rate. Using that data and making allowance for an antifreeze component, the controller calculates the output (in kW) and meters the energy (amount of heat in kWh).

A heat meter can of course be used for other system components as well (e.g. heating circuits). The heat meter is not calibrated and therefore must not be used for billing purposes.

Example:

Start-stop

This function can be used to execute simple switching tasks. A pushbutton or an on-screen key is used to switch a consumer or another function on or off.

Example: External lighting

Solar control

The solar control starts or stops a **solar pump** based on the differential between the **collector** temperature and a **reference** temperature (e.g. temperature at the bottom of a cylinder). Option: use of a limit sensor (e.g. temperature at the top of the cylinder).

Start conditions for the solar pump:

1. The **collector temperature** must exceed the minimum collector temperature and must not exceed the maximum threshold "T.coll. max.".
2. The set **differential** between the collector temperature and the reference temperature must be exceeded.
3. The **reference temperature** must not yet have reached its maximum limit "T.ref. max.".

If the **optional** limit sensor is used, it must not have reached the **limit temperature**.

Example (without limit sensor) with a link to the settings:
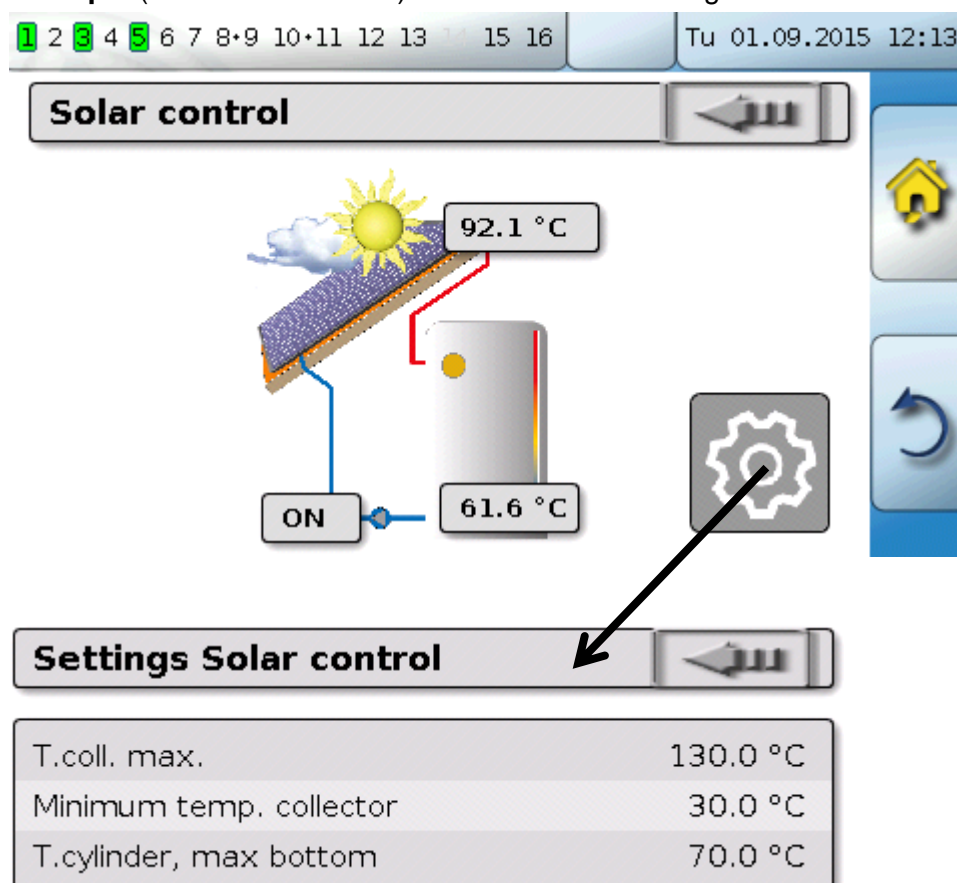
When the collector exceeds a certain temperature (e.g. 130 °C) the system comes to a standstill and it is assumed that steam is present in the collector, usually making circulation of the heat transfer medium impossible. For this reason, the collector sensor has an adjustable maximum limit, **T.coll. max**. If that limit is exceeded, the solar function stops and is not enabled again until the collector temperature drops below a certain level (usually 110 °C). This protective function prevents overheating of the solar pump due to lack of circulation.

The maximum cylinder temperature **T.cylinder, max bottom** should be selected according to whether the cylinder is used as a DHW or as a buffer cylinder.
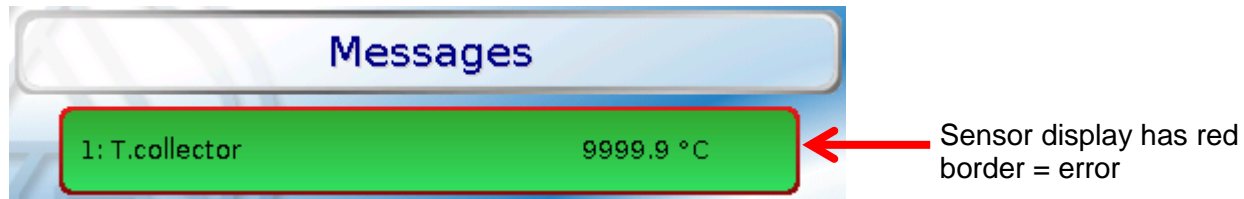
Messages

Sensor and bus errors

Subject to programming, the "Messages" menu may also display faulty sensors and incorrect CAN and DL inputs. Faults of this kind are indicated by the **right-hand warning symbol** in the status line.

Tapping the warning symbol takes you to the **Messages** menu. The incorrect inputs are displayed there.

Example:

Sensor display has red border = error

The display of 9999.9 °C for sensor 1 indicates an interruption (sensor faulty or lead break).

If **-**9999.9 °C was displayed, it would mean a short circuit in the sensor or sensor lead.

Messages with pop-up window

If the programmer has included **Messages** in the programming, they will be indicated by **pop-up windows** in different colours and by the **left-hand warning symbol** in the upper status line. A **warning tone** may also be issued.

There are four different types of messages, with varying display priority: **Error**, **Fault**, **Warning** and **Message**.

Messages can switch outputs to **dominant** on or off, which is displayed by a **red border** around the output in the status line.

Hiding a message

The message window will not **close** until you tap **Hide message**. If the message has not been deleted, tapping the warning symbol causes the message window to reappear.

Switching off the warning tone

The warning tone can be switched off by tapping **Warning tone off** or **Hide message** in the message window.

Deleting a message

The message and the warning tone can be **deleted** directly on the controller in the message window. The message cannot be deleted until the cause for the message has been removed.

Fault message type only: A specific **Reset fault** output variable is available in order to reset external devices. Activating "Reset fault" (in the message window or in the function status) generates an ON pulse lasting three seconds regardless of whether the message cause still exists at that time or not. If the event no longer occurs after the pulse, the message is deleted as well. This pulse can be used elsewhere in programming as well and therefore has various effects.

Example: **Error** message type, output 1 dominant OFF, output 2 dominant ON, warning tone activated, output for warning tone: output 12.

After the message has been triggered and the cause of the fault has been removed, the following display appears (**red**):

Output 1
dominant OFF

Output 2
dominant ON

Warning symbol

Message window

Deleting a message
(only possible when
the cause for the
message has been

Hide message =
close the
message window

Time

Message name

Message type

Visible only with
"Fault" message type
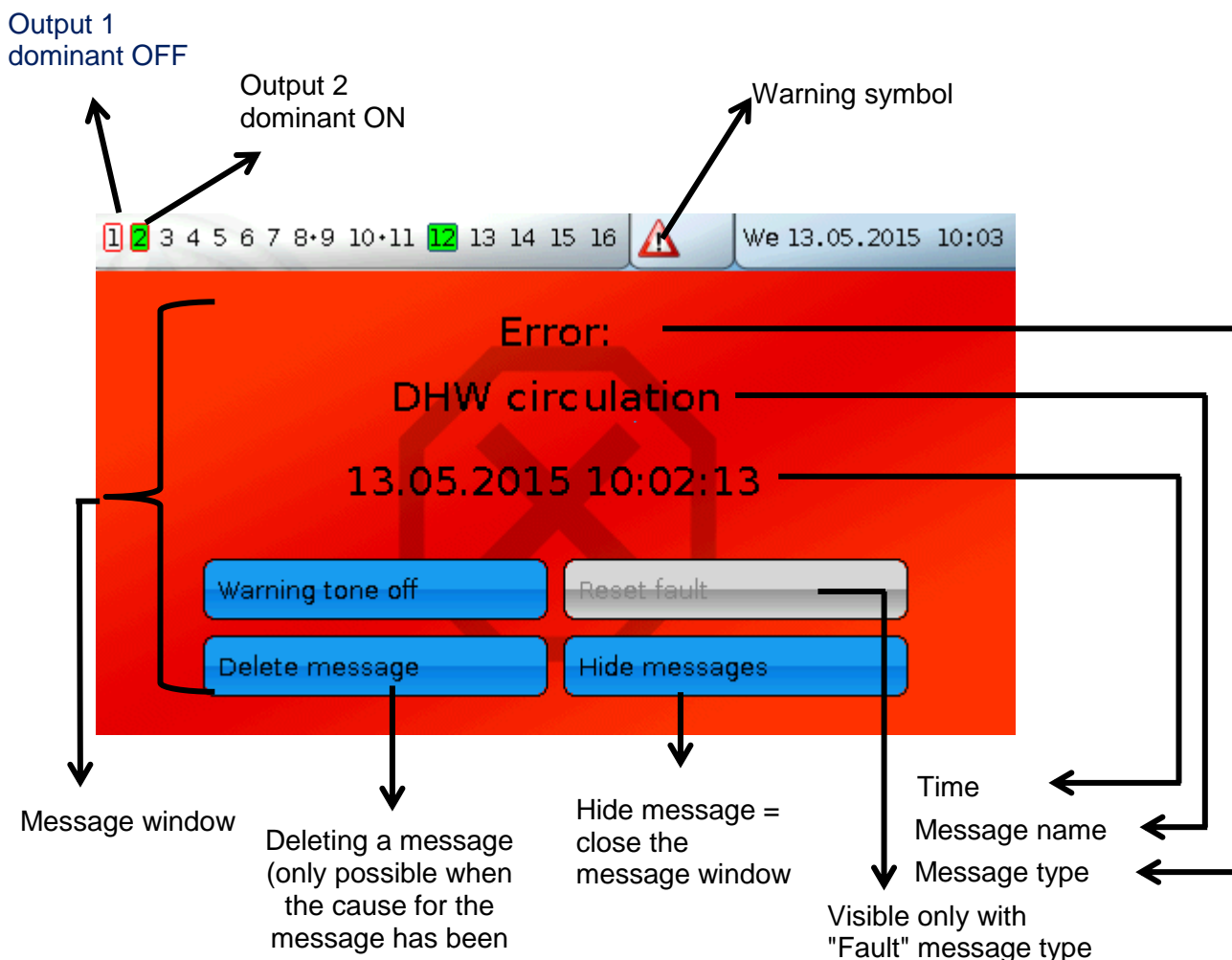
If the message window has been hidden, it can be shown again by tapping the **warning symbol** in the status line.

Example: **Fault** message type, output 1 dominant OFF, output 2 dominant ON, warning tone activated, output for warning tone: output 12.

After the message has been triggered and the cause of the fault has been removed, the following display appears (**red**):

Messages

Example: **Warning** message type, output 1 dominant OFF, output 2 dominant ON, warning tone activated, output for warning tone: output 12.

After the message has been triggered, the following display appears (**orange**):
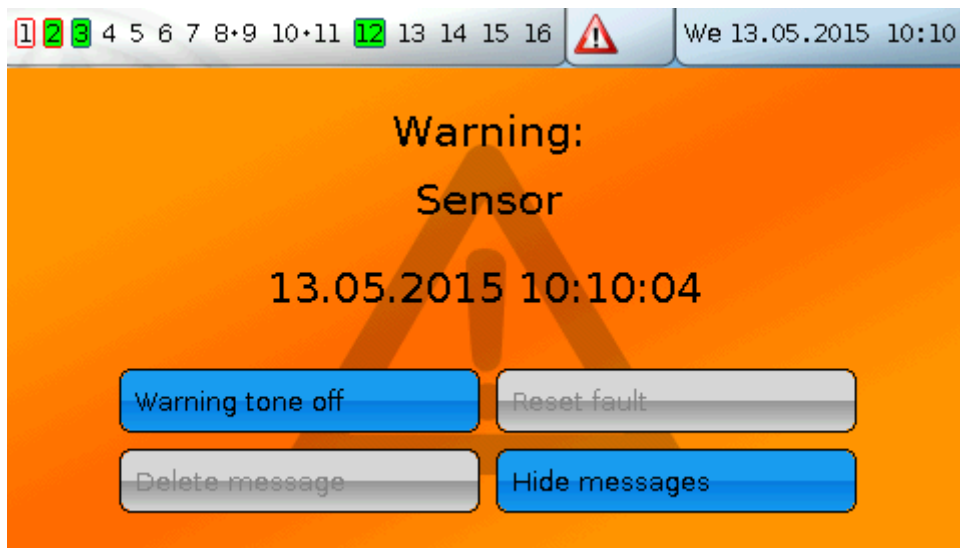
Example: **Message,** message type, output 1 dominant OFF, output 2 dominant ON, warning tone activated, output for warning tone: output 12.
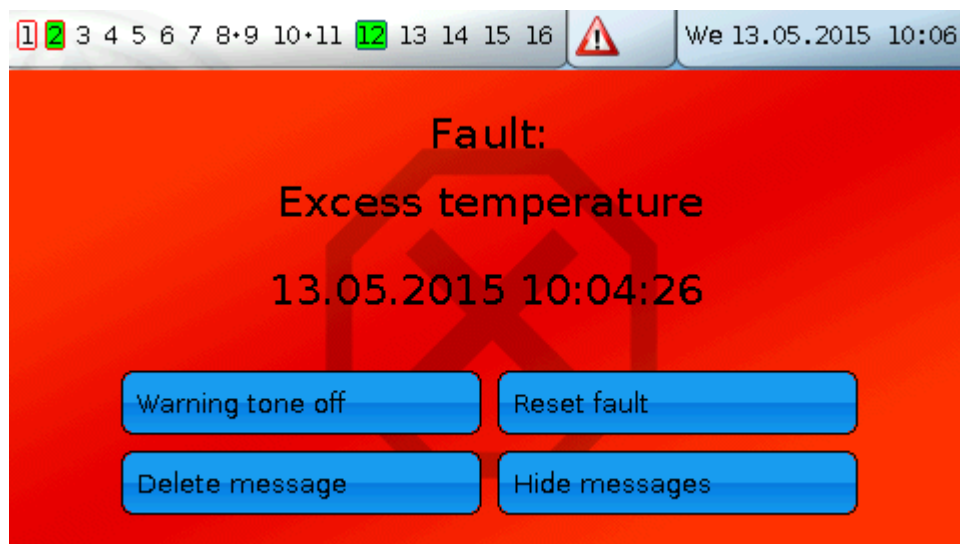
After the message has been triggered, the following display appears (**yellow**):
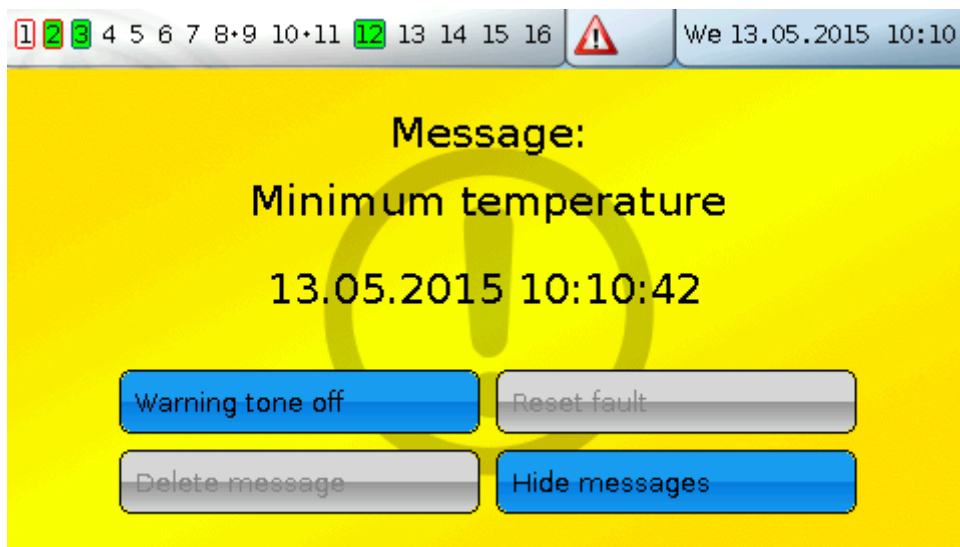
Messages menu in the main menu

This menu displays activated messages.
Example: Message 21 "DHW circulation" is active.

In the **Messages** menu, active messages are indicated by a warning symbol.

Message status

Selecting the plus sign displays the **message status**.
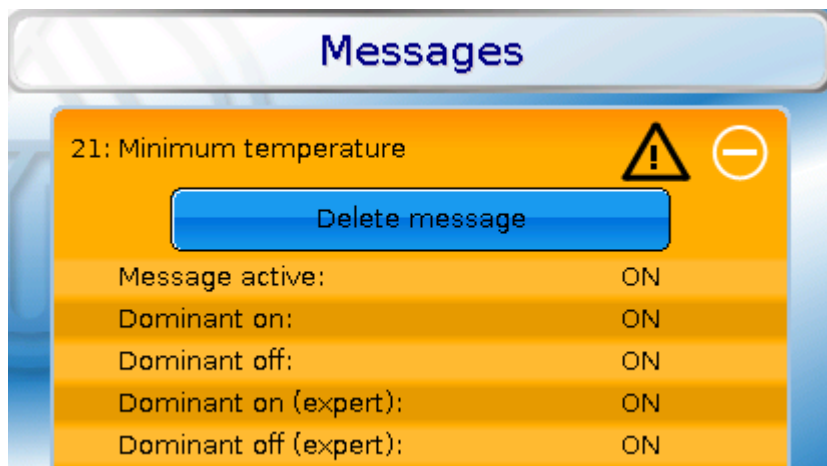
More display values can be shown by sliding the display with the pen.

Once the cause for the message has been removed, the message can be **deleted** from within the message status as well.

Main menu

The main menu contains all the elements and parameters that experts require to program the controller. In other words, programming can also be performed directly on the controller. Generally, however, programming is performed on a PC using the **TAPPS2** programming software and then loaded onto the controller.

<mark>**Users have only restricted access to this data.**</mark>

The individual menu items are described in the following.

Value summary

This screen shows the current measurements for **inputs** 1 – 16, the **DL inputs** and the analogue and digital **CAN inputs**, in tabular form.

The DL and CAN inputs are revealed by scrolling down from the inputs.

These inputs allow measurements or digital states (ON/OFF) of DL sensors or other CAN bus devices to be transferred to the controller and processed there.

Example:

Inputs

This menu shows all inputs (sensors, switches) and their current values. Users **cannot** make changes to them.

Example:

Input signals

There are three different input signals:

- **Analogue signals** are **numerical values** coming from sources like temperature sensors
- **Digital signals** are the state values **ON** or **OFF**
- **Pulse signals** come from sources like flow sensors and are converted to analogue values by the controller (e.g. flow rate in litres per hour).

Fixed values

In this menu you can define up to 64 fixed values which can be used as input variables for functions.

When this item is selected in the main menu, the fixed values already defined are displayed together with their designation and their current value or status.

Example:
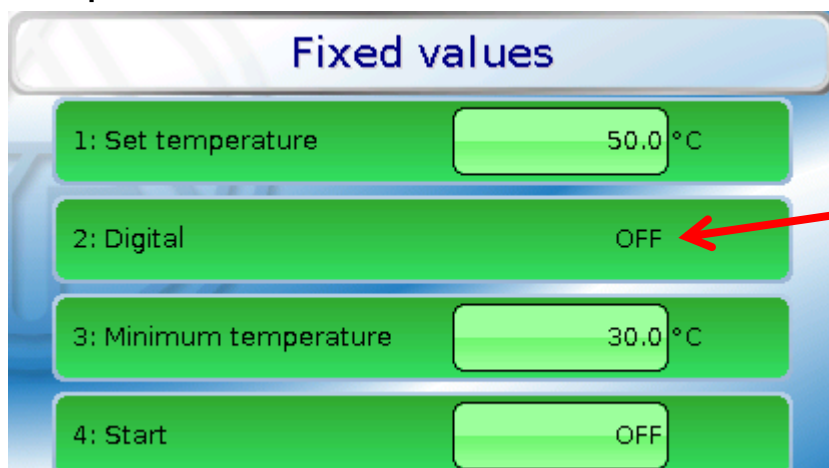
Cannot be changed by users

Fixed values enabled for changing by users can be changed by tapping the value field. Subject to programming, fixed values that can be changed may also appear in the function overview.

In the example, fixed value 2 (Digital) **cannot** be changed by users, so its value is not highlighted.

Changing a fixed value

Example: Changing fixed value 1 from 50 °C to 60 °C

Entering the required fixed value
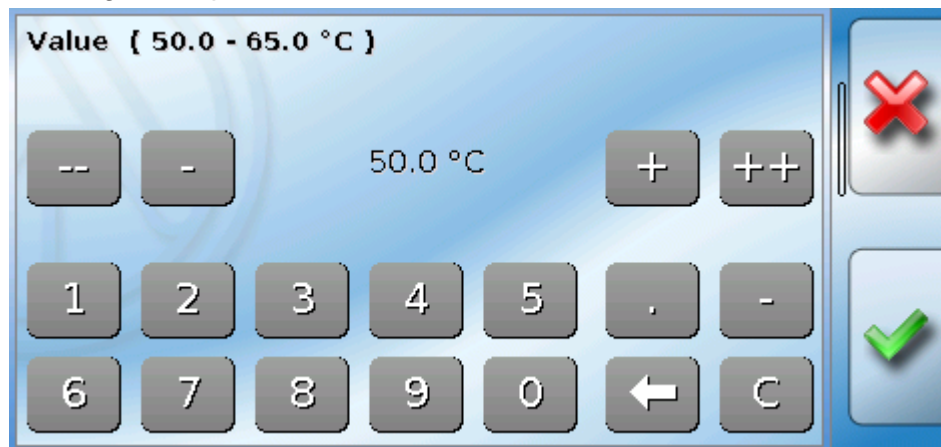
A keypad is displayed for entering numerical values.

The current setting is shown (here: 50.0 °C).

The top line shows the range in which entries are possible (here: 50.0 – 65.0 °C). The permitted setting range is predefined by the programmer.

You can make entries using either the correction keys (**--**, **-**, **+**, **++**) or the numeric keys. The correction keys **-** and **+** change the value of the first digit to the left of the decimal point; keys **--** and **++** change the second digit (the tens).

 shortens the value by one digit; sets the value to zero.

Finish and save your entry with ; discard it with .

After changing and saving the entry, the changed value is shown.

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Outputs

All programmed outputs are displayed here. Outputs 1 – 11 are always switching outputs. Outputs 12 – 16 can be switching outputs or analogue outputs. Analogue outputs supply a 0-10 V or PWM signal, e.g. for speed control of pumps, modulation of burners or heat pumps, or control of special mixers.

The programmer defines which outputs can be changed by users. Those outputs appear with a border around their output status, forming an operating field for changing the status.

Example:

Cannot be changed by users
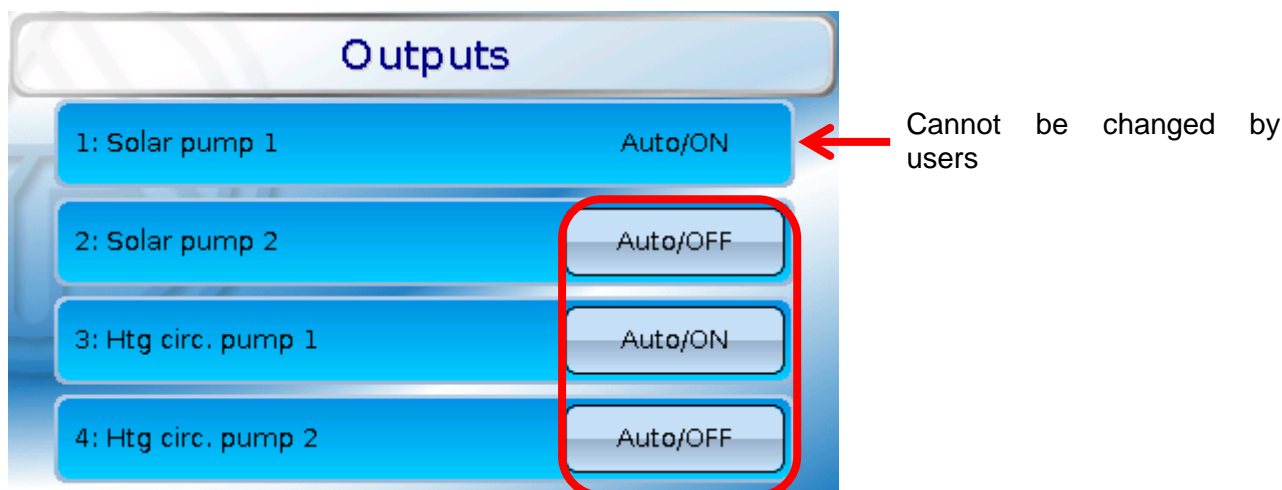
Outputs the output status of which can be changed by users can be changed by tapping the status field.

In the example shown, the status of output 1 **cannot** be changed by users, so its status is not highlighted.

Changing an output status

Example: Changing the output status of output 2 from Auto/OFF to Manual/ON.
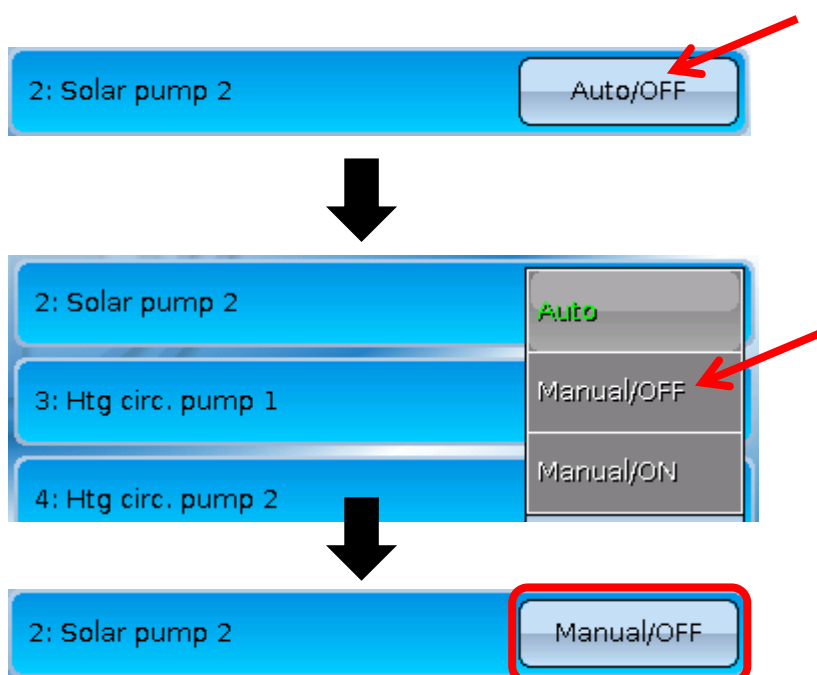
The outputs must be set to **Auto**/..... for the controller to be able to switch the outputs in line with the programming.

If set to Manual/ON, the output is **always** switched on, and if set to Manual/OFF it is **always** switched off, regardless of programming.

Analogue outputs

You can change the status of **enabled** analogue outputs as well.

In the **Manual** status, the output value can be set manually; with **Manual/OFF** and **Manual/ON**, values defaulted by the program will be output.

Output meter reading

Every output has its own meter to count the hours run and pulses (number of times switched on). Users cannot delete meter readings.

Tapping the output takes you to the view showing current meter readings.

Example:

The meter reading since 09/07/2015 can be viewed.
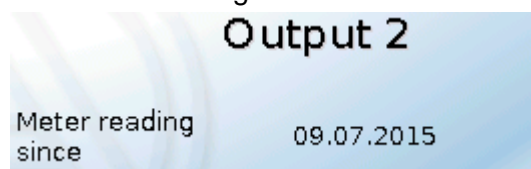
The meter shows the total hours run, the hours run the previous day and today, the previous runtime and the current runtime.

Below the hours run, the pulses (how many times switched on) can be viewed.

The meter shows the total number of pulses (times switched on), the number of pulses on the previous day and the number today.

PLEASE NOTE: The meter readings are saved to the internal memory every hour. Therefore, in the event of a power failure, no more than 1 hour of metering can be lost.

Functions

This menu displays all programmed functions (= function modules).

Changing the programming of their parameters is **not** possible for users.

Example:
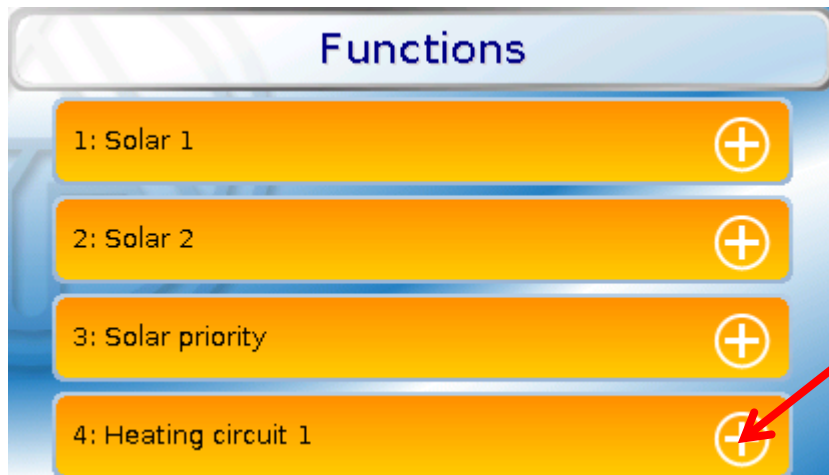
Function status

Selecting the plus sign displays the **function status**.

The values displayed are identical to the **output variables** of the function. The number of output variables varies greatly depending on the function.

Example: Heating circuit

The heating circuit has a very large number of output variables, with the most important ones shown first.

More display values can be shown by sliding the screen.

Main menu

Many functions allow the function to be started and meter readings to be deleted from within the function status screen.

Examples:

DHW demand, start heating once only

Heat meter, deleting meter reading
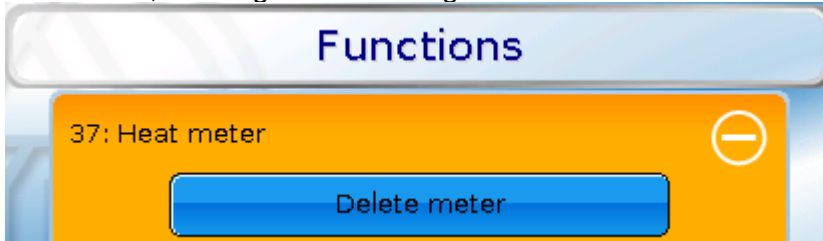
 If you tap the minus sign when the function status is open, the screen will close again.

List of all functions

There are 40 different function modules from which a program can be created. This list gives a brief overview of the role of each function.

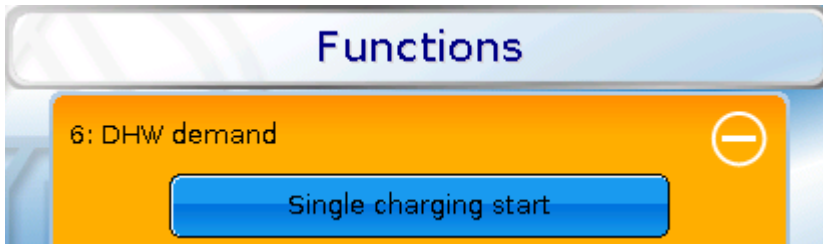|	
Analogue function	Determines the highest or lowest value. Additional functions: average, total, filter, multiplexer, demultiplexer
Heating demand	Heating demand issued by means of demand and shutdown sensors
Cooling demand	Demand for a cooling appliance issued by means of demand and shutdown sensors
DHW demand	Heating demand issued by a DHW system
Range function	Determines the definable ranges in which a value is located.
Shading function	Defaults for the blind monitoring function
Individual room control	Control of zone valves for heating and/or cooling individual rooms
Energy meter	Transfer of energy output from other sources and energy metering.
Gradient detection	Two different modes: slope detection = direction of a value change, gradient detection = speed of a value change
Heating circuit control	Control of a heating circuit, switching the heating circuit pump and control of the mixer.
Blind control	Applies the set position from the shading function or manual mode
Calendar	Defaults for operation of the heating circuit controller in the operating modes Party, Holiday, Standby and/or Bank holiday
Cascade	Coordination of up to 8 (heating) demands
Curve functions	Option of assigning a Z value to X and Y values.
Monitoring function	Monitoring of sensors and differentials
Cooling circuit control	Mixer control of a cooling circuit; switching the cooling circuit pump.
Charging pump	Differential or thermostat control of a charging pump

Pasteurisation	Pasteurisation for cylinders
Logic function	Uses logic parameters to determine results from digital inputs
Mathematics function	Various mathematical calculations
Message	Generating messages on the basis of definable events. When a message is triggered, a pop-up window appears.
Mixer control	Maintains a constant temperature by means of a mixer
PID control	A system is controlled in such a way that a sensor is maintained at a required constant value, or a constant differential is maintained between two sensors.
Profile function	Time-controlled output of numerical values, e.g. for screed drying
Sample & hold	Determines a value from the input variable at a particular time
Time switch	7-day timer with unrestricted use
Scaling function	Conversion of analogue values
Solar cooling	Cooling function to prevent overheating of solar thermal systems
Solar control	Differential control for solar thermal systems
Solar start/drainback	Two modes: start assistance for solar thermal systems; control of solar thermal drainback systems
Solar priority	Priority ranking of solar monitoring functions when there are more than one
Start stop	A latching switch
Synchronisation	Generates date-dependent or time-dependent switching signals
Timer	Time interval function with unrestricted use
Comparison	Compares two (temperature) values (= thermostat)
Heat meter	Metering of thermal energy
Maintenance function	Service function for a flue gas inspector and/or a simple burner switch for a flue gas emissions test
Conservatory function	Opens a window for airing when a certain temperature is reached
Meter / counter	Counting of hours run or pulses (e.g. for metering of electricity, water or gas)
DHW circulation	Time control and temperature control of a DHW circulation pump

CAN bus

This menu contains all of the information and settings required to set up a CANopen network. Up to 62 CAN bus devices can be operated in one network.
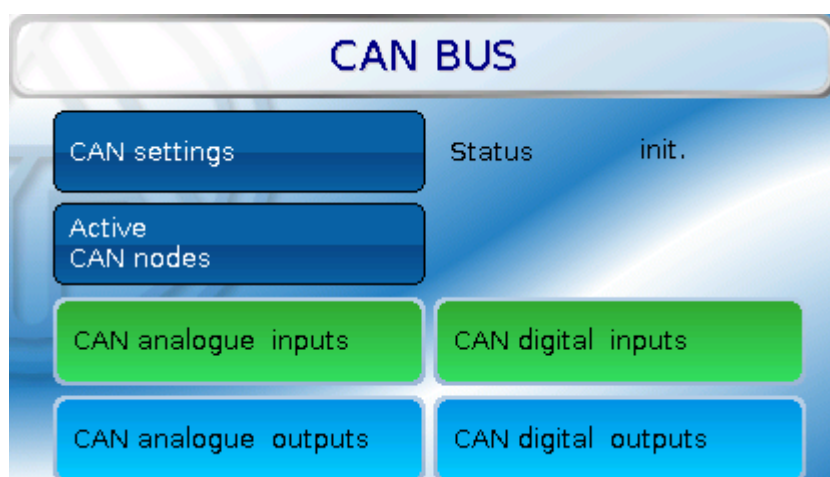
CAN inputs and outputs

The CAN network allows communication between CAN bus devices. When values are sent via CAN **outputs**, other CAN bus devices can utilise those values as CAN **inputs**.

Values received via CAN inputs can be applied by other CAN bus devices and used for other purposes in the programming. The CAN bus can also be used for logging data in a datalogger.

Example: CAN analogue inputs
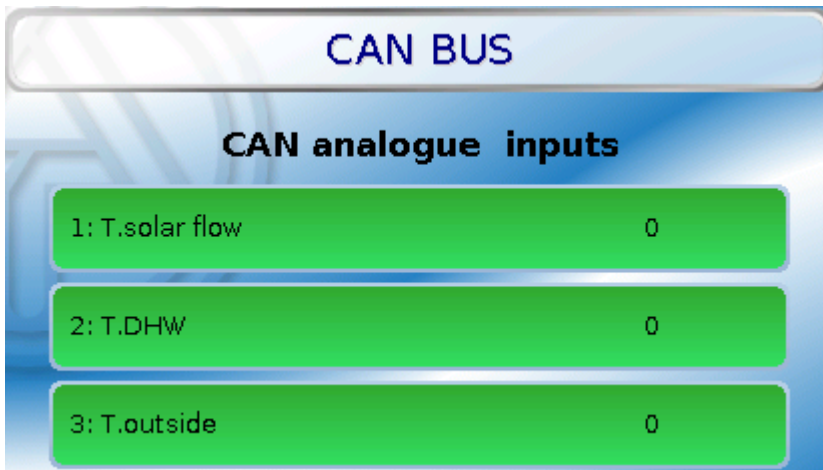
The designation and current value of programmed CAN inputs and outputs are displayed. Users **cannot** make changes to them.

DL bus

This menu contains all of information and settings needed to set up a DL bus network.

Sensor values from DL sensors can be applied in the controller via the DL bus. The DL bus can also be used for logging of data in a datalogger.

The DL bus network operates independently of the CAN bus network.

Displays are similar to those for CAN inputs and outputs.

User

The access rights of different user categories are described in the **User levels** chapter.

Current user

Here you can change the user level after entering the password. Passwords for each level are set by the programmer.

Main menu

Version

This menu item displays the operating system version (firmware).

After that the **serial number** and the internal date of manufacture are displayed.
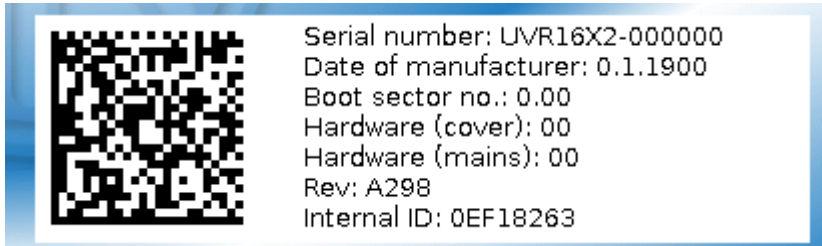
The serial number is also visible on the controller's rating plate (upper side panel).

When making support enquiries to Technische Alternative, always state the version and serial number.

Data administration

This menu item is hidden in the User level.

In data administration, function data can be saved or loaded.

It is also possible to load firmware (the operating system) onto the controller.

All data administration actions can only be carried out from the Technician or Expert level.

Troubleshooting

No display points to a power failure. Therefore first check the controller's power supply and then its fuse (glass tube fuse 20x5 mm, 6.3 A fast) which protects the device from short circuits and overcurrent due to earth faults. The glass tube fuse is located on the back of the controller behind a screw cap.

Replacing the controller's fuse

The fuse has blown for a reason (short circuit or overload). You should therefore always have the outputs checked by an electrician so that the controller is not damaged by further short circuits or earth faults (e.g. scorched relay contacts). However, the fuse may also blow due to a short circuit in the controller itself. In that case, the controller must be returned to the manufacturer for repair.

1. **Pull the mains plug (so the controller is fully de-energised)**

2. Detach the controller from its mounting base:

a) Open the top flap.

View with open cover

b) With two large screwdrivers, push both locking clamps (arrows in the diagram on the left) and lever the device out of its mounting base.
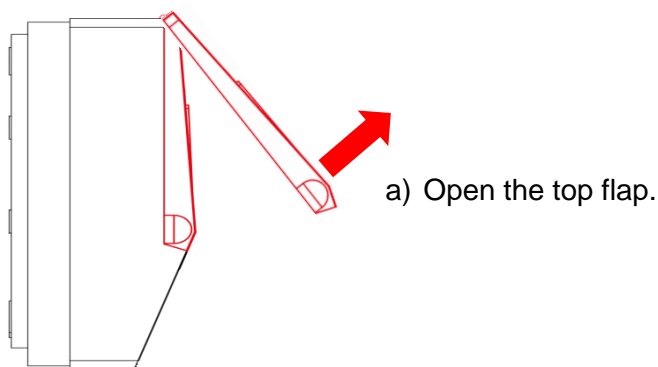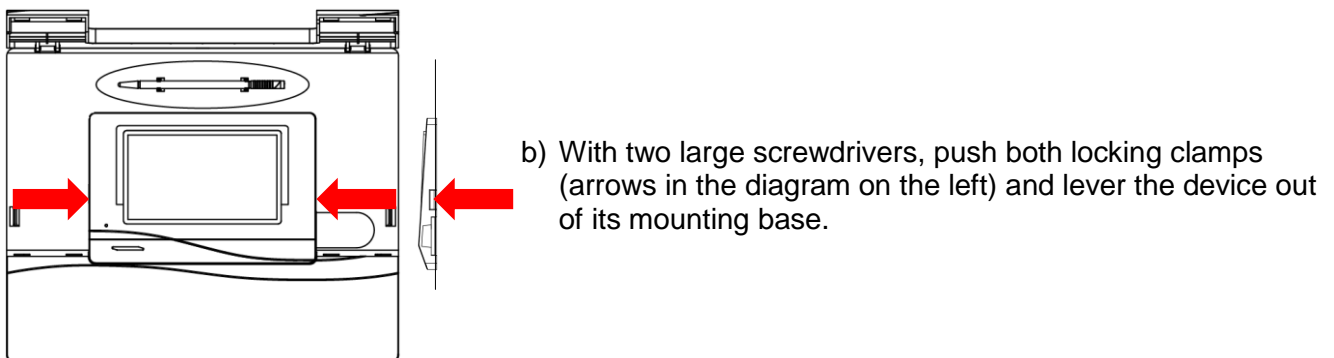
Troubleshooting

Glass tube fuse 20x5 mm,
6.3 A fast

On the back of the controller there is a small black screw cap (the fuse holder). Use a screwdriver to turn the screw cap anti-clockwise a short way until the screw cap springs out.

3. Pull the fuse out of the fuse holder and check if the fuse has blown. If in doubt, replace the fuse.

4. Re-insert the fuse holder and turn it clockwise a short way. Carefully place the controller back in the mounting base. When inserting it, make sure that cables do not prevent the plug-in pins from making contact with the plug-in strip.

5. Plug the mains plug back in the socket.

If problems occur with the **heating circuits** or the **domestic hot water**, first check that the <mark>time and date</mark> are set correctly.

Then check the relevant time programs of the <mark>Time switch</mark> function. It may be that a heating circuit, the DHW demand or the DHW circulation function is presently outside a programmed time window. Many problems can be explained in that alone.
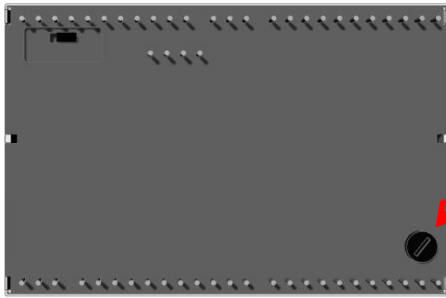
Check that an output has not been accidentally <mark>set to Manual</mark> (the hand symbol will be shown under the relevant output in the status line). The manual setting disables the control for that output – the output (e.g. pump or mixer) is permanently set to "Manual/OFF" or "Manual/ON", regardless of what the control actually requires.

<mark>Sensor error</mark>: Check if a sensor input is showing +9999.9 °C (=lead break) or -9999.9 °C (=short circuit).

Subject to programming the error may be indicated in the status line by a warning symbol:
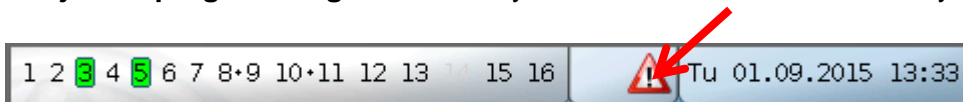
Tapping the warning symbol takes you to the **Messages** menu. The incorrect inputs are displayed there.

Example:

Sensor display has red border = error

Sensor 1 shows an interruption (sensor fault or lead break).

If -9999.9 °C was shown, it would mean a short circuit in the sensor or sensor lead.

Heating circuit

The room temperature is too low	
Cause	**Remedy**
Controller is switched off	Check the fuse for the heating circuitry in the distribution board
	Heating emergency stop switch is switched on?
	Check the fuse in the controller (back of the controller) 6.3 A fast, 20x5 mm
Burner fault	Check the burner, remedy the fault
Radiator valve(s) set too low	Open radiator valve further
Controller settings	Increase the set room temperatures (T.room standard or T.room setback); also possible in a time program if programming permits
	Change the slope, curvature or level of the heat curve (depending on the programming) *
Cannot be identified	If you cannot solve the problem, call your heating contractor

* For detailed instructions, see the sub-chapter **Correcting the heat curve to solve room temperature problems**

The room temperature is too high	
Cause	**Remedy**
Radiator valve(s) set too high	Close radiator valve further
Controller settings	Reduce the set room temperature (T.room standard or T.room setback); also possible in the "Time switch" function's time program if programming permits
	Change the slope, curvature or level of the heat curve (depending on the programming) *
	Check whether the heating circuit pump output and the mixer output are set to AUTO (if not, set to AUTO)
Cannot be identified	If you cannot solve the problem, call your heating contractor

* For detailed instructions, see the sub-chapter **Correcting the heat curve to solve room temperature problems**

Troubleshooting

Correcting the heat curve to solve room temperature problems

When the heating system is commissioned, the parameters should always be set by the heating installer. We provide you with the following instructions for subsequent re-adjustment.

In order to save energy, corrections should only be made in small steps. You should wait at least one day after each correction before making any further correction.

The corrections suggested in the following table all apply to the "Heating circuit controller" function for the relevant heating circuit.

Problem	Solution for heat curve in Temp. mode	Solution for heat curve in Slope mode
All rooms are overheated at **any** outside temperature	Decrease the set room temperatures T.room standard or T.room setback	Decrease the set room temperatures T.room standard or T.room setback
Room temperature is too low at **any** outside temperature	Increase the set room temperatures T.room standard or T.room setback	Increase the set room temperatures T.room standard or T.room setback
Room temperature **too low in winter** but correct in spring/autumn	Increase the "T.flow -20°C" value in the "Heat curve" sub-menu	Increase the slope value in the "Heat curve" sub-menu
Room temperature **too high in winter** but correct in spring/autumn	Decrease the "T.flow -20°C" value in the "Heat curve" sub-menu	Decrease the slope value in the "Heat curve" sub-menu
Room temperature right in winter but **too low** in **spring/autumn**	Increase the "T.flow +10°C" value in the "Heat curve" sub-menu	Increase the set room temperatures T.room standard or T.room setback **and** decrease the slope value in the "Heat curve" sub-menu*
Room temperature correct in winter but **too high** in **spring/autumn**	Decrease the "T.flow +10°C" value in the "Heat curve" sub-menu	Decrease the set room temperatures T.room standard or T.room setback **and** increase the slope value in the "Heat curve" sub-menu

* Applies only to the **Slope** heat curve mode:
Adjust the **set room temperature** so as to balance out the temperature differential. Then change the slope in the opposite direction by 0.05 per 2° of temperature differential.
Example: The room temperature is about 4 degrees too low in spring/autumn but is adequate in winter. You therefore need to increase the set room temperature by that amount and decrease the slope by 0.1.

DHW

DHW temperature is too low even though the cylinder is warm	
The set DHW temperature is too low	Set a higher temperature in the "DHW demand" function; check the time program of the "Time switch" function
Air in the cylinder	Vent the cylinder (notify the installer)

Glossary

As many users are non-experts and therefore unfamiliar with important terms used in heating and control technology, here is a list – by no means exhaustive – of terms with explanations, in alphabetical order:

Actual value	An actual value is a measured, momentary value of a control variable.
Analogue value	An analogue value is the momentary value of a measured variable (e.g. temperature, radiation, humidity, etc.). The value can change continuously to any value.
Buffer cylinder	In a heating system, the term buffer cylinder is used to refer to a thermal store filled with water. It is used to compensate differentials between the amount of heat generated and the amount of heat consumed, and for smoothing of output fluctuations. This allows heat generation to proceed largely independently of consumption, which for many energy sources results in improved operating performance and efficiency.
Charging pump	For our controllers, the term digital value means a value of "OFF" or "ON" (actually "0" or "1"). As an output variable, this constitutes the command to switch an output off or on. As an input variable, a digital value can be used to enable a function module, for example.
Digital value	For our controllers, the term digital value means a value of "OFF" or "ON" (actually "0" or "1"). As an output variable, this constitutes the command to switch an output off or on. As an input variable, a digital value can be used to enable a function module, for example.
Display	The display is the screen on the controller which forms the interface between the controller and the user.
Diverter valve	Diverter valves are also called three-way valves. By switching an actuator on or off, the flow medium can be conveyed in two different directions, e.g. either to a buffer cylinder or to a DHW cylinder.
Flow	In the field of heating technology, the term "flow" refers to the pipe in a heating circuit which **supplies** the heating water, which is to say **from** the generator **to** the consumer.
Function, function module	40 different function modules (e.g. heating circuit controller) are stored in the UVR16x2 controller, which can be linked to each other by means of input and output variables. Input and output variables also form the connection to the inputs and outputs. The modular structure of the controller makes the UVR16x2 extremely versatile and universal in application.
Heat curve	Radiators must be supplied with a certain temperature to heat the rooms of a building adequately at different outside temperatures. The relationship between the outside temperature and the flow temperature required for heating is described by the heat curve. This curve varies from building to building as it depends on a variety of factors.

The heat curve is set on the controller. It utilises an outside temperature sensor, a room sensor and corresponding settings to change the level of the flow temperature.

The heat curve is not completely straight because the variation in the heat released from the radiators at different temperatures is not linear.

A correctly set heat curve will result in reduced heat losses and improved control of room temperatures, thus saving energy. |
| **Input** | For our controllers, the term "input" means the sensors (e.g. temperature sensor, radiation sensor, humidity sensor, etc.) which supply |

	measurements to the controller (analogue input). An input can, however, also be a simple on-off switch (digital input).
Input variable	The input variables of the function module provide the module with all the data required for the internal decision. Frequently, these are temperatures.
K, kelvin	The kelvin (unit symbol: K) is the SI base unit of thermodynamic temperature and is also a statutory temperature unit; it is used in this manual to specify temperature differentials. The kelvin was named after William Thomson, later Lord Kelvin, who at 24 years of age introduced the thermodynamic temperature scale.
Mixer	The most common use of a mixer is as a heating circuit mixer. By moving to **intermediate positions**, the mixer can direct a greater or lesser flow from the heat source to the heating circuit, controlling the heating flow temperature in accordance with the heat curve by mixing heating water of different temperatures. The mixer is driven by a mixer motor; sometimes also by means of bi-metal in the case of thermal mixers.
Output	For our controllers, the term output means either a switching output for an item of equipment (e.g. pump) that is switched on or off by the controller, or analogue outputs to generate controlled voltages (0-10 V or PWM). An output is controlled by an output variable of a function. The UVR16x2 comes with 16 outputs as standard.
Output variable	An output variable represents the result of a function module. It can be used to switch an output directly, or can serve as the input variable for another module, and/or can be forwarded to other CAN bus devices as a CAN output.
Return	The pipe carrying water **back to** a heat generator or cooling appliance is referred to as the return.
Sensor	A sensor captures a physical entity (e.g. temperature) and transmits it in the form of an electrical value (e.g. resistance) to a controller for processing.
Set value	The set value or setpoint is the required value of a variable, to be reached and maintained in a control loop. The value can be specified by the user or by the controller itself.

Guarantee conditions

Note: The following guarantee conditions do not limit statutory rights to a warranty, but rather expand your consumer rights.

1. Technische Alternative elektronische Steuerungsgesellschaft m. b. H. provides a two-year guarantee from the date of purchase to the end user for all devices and parts it sells. Defects must be reported immediately upon detection and within the guarantee period. Technical support can supply the correct solution no matter what the issue. In this respect, contacting us immediately will help to avoid unnecessary expense and effort in troubleshooting.

2. The guarantee includes free repair (but not the cost of on-site fault finding, removal, refitting and shipping) due to processing and material defects which impair operation. Goods will be replaced in the event that a repair is uneconomical in the opinion of Technische Alternative for reasons of cost.

3. Excluded are losses resulting from the effects of a voltage surge or abnormal ambient conditions. Likewise, no liability can be accepted if the device defect is due to: transport damage for which we are not responsible, incorrect assembly and installation, incorrect use, failure to observe the operating and installation instructions or incorrect maintenance.

4. The guarantee will become void if repairs or actions are carried out by people who are not authorised to perform them or have not been so authorised by us, or if our devices are operated with spare parts, auxiliary parts or accessories that are not considered to be original parts.

5. Faulty parts must be returned to our factory with a copy of the proof of purchase and a precise fault description. Processing is accelerated if an RMA number is requested via our homepage www.ta.co.at. The defect must be clarified with our technical support beforehand.

6. Services provided under guarantee result neither in an extension of the guarantee period nor in a commencement of a new guarantee period. The guarantee period for fitted parts ends with the guarantee period of the whole device.

7. Further or other claims, especially those for compensation for losses other than to the device itself, insofar as such liability is not required by statute, are excluded.

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